This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

Claim 1. (Currently Amended) A method of writing data in a ternary WORM (Write Once Read Many Times) optical data storage with two-photon fluorescent readout comprising the steps of:

(h) providing a data storage medium composed of a transparent polymer impregnated with a photo-acid generator and a reactive dye;

(i) focusing a near infrared tunable laser into the storage medium with high intensity short pulses causing the photo-acid generator to absorb the high intensity short pulses, undergo two-photon absorption and generate a proton ion (H^+) that is donated to the reactive dye; and

(j) forming a stable balanced ion pair with the negative counter-ion from the photo-acid generator and the positive ion reactive dye wherein the stable ion pair ~~absorbing the high intensity short pulses in the photo-acid generator to~~ forms a data storage voxel (volume pixel) encoding data into the data storage medium.

Claim 2. (Currently Amended) A method of reading data from a ternary WORM (Write Once Read Many Times) optical data storage with two-photon fluorescent encoded data comprising the steps of:

(k) providing a data storage voxel (volume pixel) containing a photo-acid generator and a reactive dye;

(l) exciting the reactive dye with a plurality of light sources to generate fluorescent values and creating changes in optical properties of the data storage voxel;

(m) measuring intensity values of each of the fluorescent values; and

(n) reading differences in the intensity values to determine data in the data storage voxel.

Claim 3 (Currently Amended). A ternary WORM (Write Once Read Many Times) optical data storage device with two-photon fluorescent readout comprising:

(a) a multiple layered data storage medium composed of a transparent polymer impregnated with a photo-acid generator and a reactive dye; and,

(b) ~~said~~ the storage medium having been subjected to high intensity short pulses from a focused near infrared tunable laser whereby the photo-acid generator absorbs the high intensity short pulses, undergoes two-photon absorption and generates a proton ion (H^+) that is donated to the reactive dye causing the negative counter-ion from the photo-acid generator and the positive ion reactive dye ~~forms~~ to form a data storage voxel (volume pixel) ~~and~~ wherein the reactive dye provides fluorescent values.

Claim 4 (Currently Amended). A multilayer data storage system based on two-photon induced recording and two-photon fluorescence readout technology comprising the steps

(a) creating a multilayered optical disk as the data storage medium cast from a transparent polymer impregnated with a photosensitive Photo-Acid Generator (PAG) and a reactive dye (RD)

(b) focusing a near infra-red tunable laser into said storage medium causing the photo-acid generator to undergo two-photon absorption and generate a proton ion that is

donated to the reactive dye causing the formation of a data storage voxel with for the data writing process;

(c) forming a multiplicity of stable balanced ion pairs from the negative counter-ion, PAG^-, and the positive RD^+. to make volume pixels corresponding to the encoded data in the medium;

(d) retuning said near-IR laser for data reading by stimulating the fluorescence of the fluorescence emitter (FE) and RD.; and,

(e) reading the fluorescence output signals of the FE and RD, whereby a ternary data-encoding scheme is realized.

Claim 5 (Original). The multilayer data storage system based on two-photon induced recording and two-photon fluorescence readout technology according to claim 4 wherein a 2-photon laser light pulse (~10μs), 800nm light is used for the data writing process step.

Claim 6 (Currently Amended). The multilayer data storage system based on two-photon induced recording and two-photon fluorescence readout technology according to claim 4 wherein the reactive dye (RD) is a stable ~~fluorine~~ fluorene dye.

Claim 7 (Original). The multilayer data storage system based on two-photon induced recording and two-photon fluorescence readout technology according to claim 4 wherein the tunable laser is Ti:Sapphire.

Claim 8 (Original). The multilayer data storage system based on two-photon induced recording and two-photon fluorescence readout technology according to claim 4 wherein the multiplayer is at least approximately 5 layers.

Claim 9 (Original). The multilayer data storage system based on two-photon induced recording and two-photon fluorescence readout technology according to claim 4 wherein said high intensity beam provides short pulses at approximately 730 nm.

Claim 10 (Currently Amended). A multilayer data storage system based on two-photon induced recording and two-photon fluorescence readout technology comprising:

(a) a multilayered optical disk as the data storage medium cast from a transparent polymer impregnated with a photosensitive Photo-Acid Generator (PAG) and a reactive dye (RD).

(b) a near infra-red tunable laser which can be focused into said storage medium for the data writing process causing the photo-acid generator to undergo two-photon absorption and generate a proton ion that is donated to the reactive dye causing the formation of a data storage voxel (volume pixel);

(c) volume pixels corresponding to the encoded data in the medium;

(d) means for retuning said near-IR laser and thereby stimulating the fluorescence of FE and RD for data reading; and,

(e) means for reading and comparing the fluorescence output signals of the FE and RD, whereby a ternary data-encoding scheme is provided.

Claim 11 (Original). A multilayer data storage system according to claim 10 wherein the data storage medium has at least 5 layers.

Claim 12 (Original). A multilayer data storage system according to claim 11 wherein the data storage medium has approximately 5 to approximately 50 layers.

Claim 13 (Original). A multilayer data storage system according to claim 10 wherein the data storage medium has approximately 59 to approximately 200 layers.

Claim 14 (Original). A multilayer data storage system according to claim 11 wherein the data storage medium has approximately 300 to approximately 500 layers.

Claim 15 (Original). A multilayer data storage system according to claim 10 wherein a 2-photon laser light pulse (~approximately 10μs), approximately 800nm light is used for the data writing process step.

Claim 16 (Original). A multilayer data storage system according to claim 10 wherein the tunable laser is Ti:Sapphire.

Claim 17 (Original). A multilayer data storage system according to claim 10 wherein said high intensity beam provides short pulses at approximately 730 nm.

Claim 18 (Original). A ternary WORM (Write Once Read Many Times) optical data storage device comprising a multilayer data disk storage system for CD/DVD systems composed of at least approximately five layers of an optically transparent polymer impregnated with a photo-acid generator and a reactive dye.

Claim 19 (Original). A ternary WORM (Write Once Read Many Times) optical data storage device according to claim 18 wherein has from approximately five to approximately fifty layers of said transparent impregnated polymer.

Claim 20 (Original). A ternary WORM (Write Once Read Many Times) optical data storage device according to claim 18 wherein has from approximately fifty to approximately tow hundred layers of said optically transparent impregnated polymer.

Claim 21 (Original). A ternary WORM (Write Once Read Many Times) optical data storage device according to claim 18 wherein has from approximately three hundred to approximately five hundred layers of said optically transparent impregnated polymer.

Claim 22 (Original). A ternary WORM (Write Once Read Many Times) optical data storage device according to claim 18 wherein the bit length is approximately 0.576μ.